MONTANA

OUTDOORS

MONTANA OUTDOORS

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THE COVER

The courtship stance of the strutting male sage grouse surely ranks as one of nature's finest displays. The bird on the front cover was captured by the camera of C. Robert Watts. The back cover features the peregrine falcon and the photographic skill of Jay Sumner. Should the peregrine continue its downhill trail towards extinction, Montana will have lost one of its most magnificent and beautiful species of wildlife.

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A LIVABLE ENVIRONMENT FOR WILDLIFE IS A QUALITY ENVIRONMENT FOR MAN

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dear F&G

HAIL MONTANA

I wish to take this opportunity to say what an h o n o r and privilege it was to receive the first MONTANA OUTDOORS magazine. I think your magazine was just wonderful, and after reading it cover to cover I surely want to be among the first subscribers next July.

I only wish I could be lucky enough to live in your state someday.

I hope the residents of your fine state realize how lucky they really are. If they were to come back East and live for a few weeks they would soon be ready to head back to the big sky country. I hunted two years ago around Big Timber and what breath-taking scenery. I'm afraid to come back again because I know I'll have to stay!

A. D. Guthrie
Albion, Ind.

COULDN'T CLIP IT

No one who treasures this publication could bring himself to clip the coupon on page 1 of the January/February, 1971, issue (for subscription use) thereby destroying picture, caption and editor's note (on page 2) of the article entitled, "The Fundamentals."

With every good wish for the New Year and continuing success for MONTANA OUTDOORS. May its word go far and wide, a teaching tool, a learning light = an enlightened public facing its responsibilities with erudition.

Scotty Prescott
White Sulphur Springs

Please notice the handy tear-away subscription coupon in this issue. It's especially for readers who shy away from defacing their treasures.

IT'S JUST GREAT

Your new and enlarged MONTANA OUTDOORS is just great. What a difference from your former publication. The photos by Mike Sample were some of the best game photos I have seen. I found your story on grizzlies (November/December issue) most interesting and packed with information. Keep up the good work and I am looking forward to your next issue.

Jerry Eichwald
Queens Village, N.Y.

TALL REQUEST

Dear Sir,

I would like some information about your state. I would like to know about the glaciers, parks, forests and wildlife. Then I would like to know about other interesting things that happened the last 100 years.

signed, Jeffery D. Dodge
Dorchester, Wis.

REQUIRED READING

My husband and I are so pleased with the November/December issue of MONTANA OUTDOORS that we felt we must write and tell you so. The pictures are outstanding and so are the articles.

I have already given the "Are You a Safe Hunter" test to my pupils and have assigned "The Grizzly: Montana's Pride" as required reading. I am sure the rest of the magazine will be voluntarily read.

Mrs. LeRoy Torgerson,
Teacher
Ethridge, MT

SPREADING THE WORD

I hope you will convey my profound congratulations to Editor Bill Schneider and his staff on the beauty and quality of the latest publication. I have seen this magazine since 1940 and can honestly declare this one to be the grandest of them all. By far.

The photos are brilliant and the stories and features have positive punch.

It makes a person proud to be a Montanan when he sees such a wonderful product. I have put all the glowing, laudatory remarks and comments on the air here.

John T. Campbell
KYSS Radio
Missoula

AN INSEPARABLE ALLIANCE

by Tom Mussehl

Clearing the land of sagebrush in favor of livestock forage is the source of controversy between two dedicated groups, conservationists and agriculturists. The latter argue that livestock subsist better on land that is free of sagebrush. However, conservationists point out that for certain species of wildlife, sagebrush means "life." It's eradication would undoubtedly mean their demise.

An open sagebrush prairie with a diversity of forbs and sage stands as the single most important factor in sound sage grouse management. Unfortunately these areas are often prime targets for sagebrush removal projects. (F&G photo by Eldon Smith)

From the standpoint of wildlife management sagebrush is one of the most valuable native plants in Montana. Unlike many plants, sagebrush retains its nutritious leaves throughout the winter, often providing the only food available above the snow. It has food or cover value for many kinds of wildlife, and in Montana it is of particular importance to sage grouse, antelope and mule deer.

SAGE GROUSE

As indicated by the names, an inseparable relationship exists between sage grouse and sagebrush. Unlike other chicken-like birds, the sage grouse does not have a thick, muscular gizzard so its diet is restricted to soft, leafy foods. In winter the only available soft forage is the leaf material on sagebrush plants. **Studies in Montana and other western states have shown that the winter diet of sage grouse is nearly 100 per cent sagebrush and the year-around diet more than 75 per cent.**

The dependency of sage grouse upon sagebrush varies with the season, becoming most critical during the winter. Wintering birds tend to gather in large flocks and concentrate in certain sagebrush areas. Studies of radio-tracked grouse in central Montana show that during heavy snow conditions small patches of dense sagebrush are essential to these birds. Although sagebrush may appear limitless at other times of the year, stands of sagebrush that provide adequate wintering sites for sage grouse are at a premium in many areas.

Breeding areas (strutting grounds) are another critical part of the sage grouse habitat. By late winter sage grouse begin to concentrate near traditional strutting grounds, which are usually openings in the sage on fairly level terrain. The importance of sagebrush cover in the vicinity of strutting grounds has been well documented. A recent study of individual strutting grounds using telemetered birds found that breeding birds and nesting hens may seek certain sagebrush

Strutting grounds are usually located in level openings in the sage. The nearby sagebrush offers vital nesting cover as well as other life essentials. (F&G photo by Ed Schlatterer)

The sage grouse's dependency on sagebrush increases in winter. Sagebrush makes up 100 per cent of the sage grouse's winter diet. (F&G photo by Robert Rothweiler)

cover as far as three miles from the strutting ground. Numerous investigations of sage grouse nesting habits have been conducted in many western states between 1912 and the present. Most nests examined have been situated under the cover of sagebrush plants.

Summer studies in southwestern Montana during 1962-1964 found that sagebrush and dandelion made up more than two-thirds of the crop contents of 35 sage grouse. Sagebrush and three types of forbs (broad-leaved, non-woody plants) constituted more than 90 per cent of the samples. Patterson in his book, **Sage Grouse of Wyoming,** stated that only during summer does sagebrush compose less than 80 per cent of the total sage grouse diet.

During the summer sage grouse use some of the lighter densities of sagebrush cover for raising their broods. Recent studies in central Montana indicated that juvenile sage grouse preferred areas where there was an abundance and diversity of forbs with densities of sagebrush ranging from one to 20 per cent. Although stands of dense sagebrush appear to have very little value for broods, they are absolutely vital as winter habitat.

Studies are continuing in central Montana to further pinpoint seasonal habitat requirements of sage grouse and the effect of various sagebrush control methods. These include searches for sage grouse droppings on sprayed areas in which varying amounts of sage were killed. These searches revealed an absence of grouse droppings in areas where all sagebrush was killed.

Findings from these studies are expected to assist land managers in making wiser decisions in maintaining and perpetuating sage grouse habitat during multiple-use management of public rangelands.

PRONGHORN ANTELOPE

The importance of sagebrush in the diet of antelope has been documented in Montana and several other western states. Studies in central Montana in 1956 indicated that antelope are almost totally dependent on sagebrush in winter. Forbs were the most important summer food item and grass was unimportant except during part of spring. Additional antelope studies are being conducted in central Montana to determine their year-around ecology and the effect of various sagebrush control practices.

The dependence of antelope on sagebrush was solidly demonstrated in studies taken during the winter of 1966-1967. The winter diet of antelope, determined by examining feeding sites, consisted of 93 per cent shrubs, 6 per cent forbs and minor amounts of grass. Examination of 18 antelope rumens during winter showed 78 per

The courtship display of the male sage grouse is intended to attract nearby females. (Photo by Harry Lumsden)

cent shrubs, 19 per cent forbs and small amounts of grass. Big sagebrush provided the bulk of antelope food and was the only plant present in significantly higher proportions in the diet than in the plant community.

Summer studies in the same area showed that forbs comprised 86 and 97 per cent, shrubs 14 and 3 per cent, and grasses a trace, of the plants used at antelope feeding sites in 1966 and 1967. Sagebrush species constituted 28 and 14 per cent of the total use at antelope feeding sites in 1966 and 1967 and averaged 10 per cent by volume of material in rumens examined.

Other studies in 1968 and 1969 showed heavy spring use of big sagebrush by antelope with a shift to forbs during late spring and early summer. By late summer the use of browse again increased.

The value of sagebrush during severe winter was again indicated during a 1965 study of winter mortality of antelope in northeastern Montana. Antelope herds that were confined to a foothill grassland area lacking in sagebrush near Glasgow suffered a winter loss of at least 500 pronghorns, mainly due to malnutrition. Subsequent fawn production from this herd was only about half that of normal. However, antelope near Malta that were exposed to the same severe winter conditions in an area where sagebrush was abundant did not suffer heavy winter losses or a decrease in fawn production.

Sagebrush provides an important source of winter food for antelope (above) in many parts of Montana. (F&G photo by Harley Yeager) Even further, sage serves as a stop-gap to prevent winter losses of mule deer on winter ranges where other browse has been depleted. (F&G photo by Duane Pyrah)

MULE DEER

Sagebrush is also a staple winter browse for mule deer in many parts of Montana and other western states. Colorado studies reported in 1958 that of five browse species tested, only big sagebrush maintained all nutritive qualities through the critical winter season. This study stated that, "Big sagebrush contained the highest seasonal mean percentages of protein, phosphorus and crude fat, and the lowest mean percentages of crude fiber, nitrogen-free extract and calcium." Findings from Utah list sagebrush as one of the three most important deer browse there, although it was not the most preferred.

The Colorado study concluded that removal of large areas of sagebrush on critical deer winter ranges could be the beginning of the end for many deer herds in the West.

Several Montana studies have shown the importance of sagebrush to mule deer. In the Bridger Mountains sagebrush was the number one food item during winter months, complementing an overused supply of bitterbrush. Mule deer

(Left) Although it may look like a beautiful prairie flower, it's really a rear view of a male sage grouse on display. (F&G photo by Eldon Smith) (Below) Montana studies have shown that the vast majority of sage grouse nests are located under sagebrush. Without this protective cover, reproduction would, at the least, be greatly reduced. (F&G photo by Max Stone)

studies in the Little Belt Mountains, in the Scudder Creek area of Beaverhead County, in the Missouri River Breaks and at the National Bison Range reported the use of one or more species of sagebrush. Big sagebrush was considered the most important single plant in the winter and spring diets of mule deer in the Missouri Breaks. Current studies are evaluating the effects of sagebrush spraying on mule deer habitat in the Breaks.

In the generally overbrowsed mule deer ranges in the West, big sagebrush is a staple winter food that reduces deer winter losses when other browse species are depleted.

THE CONFLICT

Viewpoints about the value of sagebrush vary according to the products desired from the land it grows upon. Sagebrush became a controversial plant after widespread use of chemicals began in the 1950's to kill sagebrush in order to promote the development of grasses for livestock forage. In addition to sagebrush, herbicide spraying unfortunately also kills the forbs that are essential food to wildlife in summer and fall.

Most of the large-scale programs to remove sagebrush have been based upon single-minded goals with little regard for the values of associated flora and fauna. Quality wildlife habitat requires a diversity and interspersion of plant types and there are indications that this also benefits livestock. Range treatments that convert large areas of mixed vegetation to simpler stands of grass usually also convert the area to a lower quality wildlife habitat.

Another aspect of the controversy centers around the effects of sagebrush removal on soil moisture. This is not thoroughly understood or well-documented. Contrary evidence has developed as to the value of the sagebrush crown in increasing or decreasing snow accumulations.

Undesirable features subsequently discovered in some of the chemicals used in spraying have also added to the controversy. Several herbicides are now banned on certain federal lands.

Perhaps the warning of a noted agriculturist applies to the sagebrush issue on public land — "Until we have more thorough studies of the ecosystems with which we would tamper, we can never be sure that today's quick gain may not be tomorrow's embarrassing retreat."

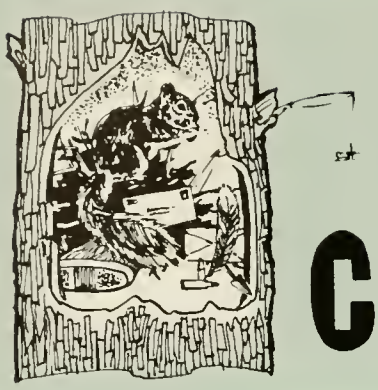
Rangeland management should be of keen interest to all Montanans and federal taxpayers. More than one-third of Montana is under public ownership, including several million acres of sagebrush-grasslands, and sagebrush spraying on private land is subsidized by Uncle Sam. **Although decisions about the type of vegetation to be maintained on private rangelands will probably be determined by the immediacy of economics, this cannot be the case on public land. The Multiple-Use Act established by Congress in 1964 states that land management must not necessarily be based on total economic return, but rather based on the overall public welfare,** and these are not necessarily synonymous terms.

This Study Area is Part of a Cooperative Research Project between the BUREAU OF LAND MANAGEMENT and the MONTANA FISH & GAME DEPARTMENT to study the effects of chemical and mechanical control of sagebrush on plant and animal ecology

A cooperative research project between the Montana Fish and Game Department and the Bureau of Land Management promises to disclose the needed information for the sound management of wildlife on sagebrush grasslands under the multiple-use concept.

Information to aid public land managers in their decision-making is being gathered by the Montana Fish and Game Department and the U.S. Bureau of Land Management in a cooperative research project that began in 1965. Findings from this study should give land managers the means to protect and enhance wildlife habitat during multiple-use management of sagebrush-grasslands.

EDITOR'S NOTE — Thomas W. Mussehl, 38, is stationed in Bozeman as chief of the department's Game Research Section. Before taking this position he was a department research biologist. He received a Bachelor of Science degree in wildlife management from the University of Minnesota, Minneapolis, in 1954 and then a Master of Science degree in the same field from Montana State University, Bozeman, in 1958.



THE CATCHALL

BAN ON BOTTLES

A recent decision by Superior National Forest Supervisor Craig Rupp has banned all non-burnable food and beverage containers from the Boundary Waters Canoe Area (BWCA) in Minnesota.

This significant environmental decision was made with the objective of curbing the amount of litter in the wilderness area. The BWCA is one of the largest and most heavily used units in the National Wilderness Preservation system.

Before this "no can or bottle decision," visitors deposited an estimated 360,000 pounds of litter in the area each year. Most of it was cans and bottles. This build-up of garbage caused an expenditure of $90,000 annually on clean-up projects. These funds can now be diverted to more beneficial programs. A wide variety of containers that will readily burn are presently manufactured, so it is felt that this decision will not seriously inconvenience campers.

Back in Montana, cans and bottles are still finding their way into wilderness areas. Many of them remain there with no purpose but to degrade the environment. It takes only one rusty can to spoil a mountain stream or one broken bottle to ruin a wilderness campsite. It goes without saying that a decision similar to Minnesota's would upgrade Montana's wilderness areas and create a considerable savings in litter removal costs.

—Izaak Walton Magazine

calling all cooks

MONTANA OUTDOORS is collecting recipes for inclusion in future issues and we would like your help. Do you have a favorite recipe for preparing wild game, fish or plants that you find in Montana? Maybe you know of a particularly delicious way to make chokecherry jam, to smoke fish, to make jerky or even to roast moose. Let us know about it and we'll publish some of the tastiest recipes. It doesn't matter whether they are cooked over the stove or the campfire.

We hope both our men and women readers will contribute their recipes. Send them to us at:

MONTANA OUTDOORS
Fish and Game Department
Helena, Montana 59601

Chicken or Grouse?

Inhabiting many flatland areas in Montana are fairly large gallinaceous birds known as "chickens." Colloquial names such as this have their place, but in certain instances they can cause confusion.

These so-called "chickens" are in reality the sharp-tailed grouse (*Pedioecetes phasianellus*) and should not be confused with their cousin the Greater Prairie Chicken (*Tympanuchus cupido*).

Most game managers feel that the prairie chicken can be considered "extinct" in Montana.

On the other hand, the sharp-tail exists in great numbers in the state and holds the position as one of Montana's most important game birds. In the field sharp-tails can be easily identified by the short, pointed tail which shows white during flight.

wildlife ranges

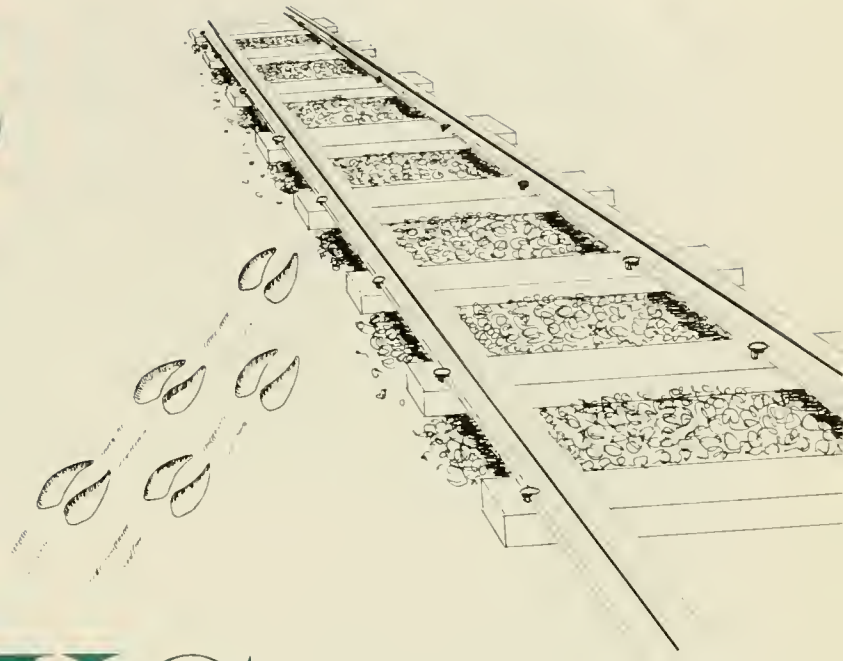
No wild animal wanders randomly over the land. Every one has an orderly range that he maintains for his use.

QUOTE

"Of what avail are forty freedoms without a blank spot on the map?" —Aldo Leopold

The sharp-tailed grouse.

DEER ON THE TRACKS



photos and story by
John E. Firebaugh

Little by little man is destroying irreplaceable wildlife habitat without considering the consequences. Dams, roads, agricultural projects and building construction all take their toll of valuable habitat in the name of "progress." While a little piece here and there may not seem like much of a loss when considered individually, the combined total is beginning to have a serious impact on wildlife.

Every time wildlife habitat is reduced or de-

The 90-mile reservoir to be created by the impoundment of the Kootenai River by Libby Dam will directly and indirectly cause a considerable loss of vital wildlife habitat.

stroyed, the carrying capacity of the land decreases. The habitat is unable to support the number of animals it originally sustained, and thus animals are lost. Such is the story at the massive Libby Dam site in northwestern Montana.

A 90-mile long reservoir, extending 42 miles into Canada, will result from the completion of the Libby Dam on the Kootenai River in 1972. Some 12,000 acres of big game winter range along the east side of the Kootenai will then be under water. The reduction of range will create problems for the deer, elk and big horn sheep wintering in the area. Studies financed by the Army Corps of Engineers are being conducted by the Montana Fish and Game Department and the U.S. Forest Service to determine the effects of this loss of habitat on wildlife.

Another form of damage to the area's habitat is indirectly caused by the formation of the reservoir. A railroad grade which formerly followed the Kootenai from Eureka to Libby has been relocated through some prime white-tailed deer winter range. In addition to destroying wildlife and fish habitat, the railroad threatens deer with the possibility of being hit by high-speed trains.

The new route, which was opened in November, 1970, extends from Stryker, about mid-way between Whitefish and Eureka, southwest along Fortine Creek, Wolf Creek and the Fisher River to the mouth of the Fisher a few miles below the dam. In the lower Wolf Creek and Fisher River area large numbers of deer concentrate on the south and west exposed slopes near the railroad grade from mid-December into April. During periods of deep snow deer are likely to seek out the cleared railroad tracks for easier movement, becoming vulnerable to the trains passing at speeds of around 80 m.p.h. The department study hopes to determine the most effective method of detracting deer from the relocated railroad.

For the past several years carcass counts were conducted in the spring along four 5-mile sections of the former railroad grade to determine the number of deer killed per mile. The number of carcasses found in a one-mile section has ranged from zero to 37, depending to a great extent on the severeness of the winter. Since the deer are now wintering in a smaller area along the relocated grade, a larger kill by trains is expected.

The densities and distribution of deer wintering in the area of the relocated railroad are determined by pellet group readings taken each spring. Twenty-two permanent pellet group transects were established on the Fisher River-Wolf Creek winter range in the fall of 1969 so that areas of deer concentration could be determined annually. This will aid in evaluating the best locations for detracting deer from the right-of-way. If future measures are taken to reduce the number of deer wintering along the railroad grade, or to attract deer to a "created winter range" away from the grade, the pellet group readings will indicate the effectiveness of these measures.

During the winter of 1969-70, nine white-tailed deer were trapped and marked with neckbands and ear tags so that their migration routes from summer to winter range could be studied. Once these routes are known, startegically located areas of desirable winter browse can be created along these routes but away from the railroad grade to attract a portion of the deer now wintering along the right-of-way. More deer will be captured and marked during the next two winters to facilitate observations.

The effectiveness of "created winter range" was illustrated in Alaska where moose often used the railroad tracks as pathways during winter. A large natural burn located away from the railroad grade but still on winter range created desirable moose browse. Several hundred animals were observed to use this area during one winter

Observation of deer trapped and marked during the winter of 1970 should supply much needed information on the periodic movement from summer to winter range.

This railroad grade lies between the winter range and the Fisher River, a major water supply for deer.

of intensive observation and none ventured toward the railroad grade.

Controlled burning could be used to create the desirable browse plants in Montana's situation. However, more information will be needed on movements of marked deer. In addition, studies must determine whether it would be possible to stimulate the desired browse species at specific locations and whether the browse, once stimulated, would be available to deer during the winter. Elevation, exposure, slope and habitat type of the key areas are all factors to be considered.

Another possible method of detracting deer from the railroad grade is to provide them with a water supply on the winter range side of the grade. Presently the deer must cross the railroad tracks to obtain water because the relocated grade lies between the winter range and the major water supply, Fisher River and Wolf Creek. This situation exists for about 90 per cent of the distance from the mouth of the Fisher to where Richards Creek enters Wolf Creek, an area considered to be the extent of the winter range during an average winter. A water supply located on the winter range side of the grade may reduce the number of deer crossings and hence the number of deer kills.

Experimentation with these and other methods of detracting deer is the only possible way to determine which method, or combination of methods, will be most effective. Perhaps the combination of a water supply on the winter range side of the grade and some controlled burns at strategic locations would be the answer.

Other methods that should be considered to help relieve the situation are: the use of deer-proof fences on critical sections; paths in the snow bulldozed parallel to the grade to allow deer easier movement; increased hunting pressure to remove more of the surplus deer during the fall, and perhaps the possibility of having night train speeds reduced during winter months through critical kill areas. Literature reviews have indicated that deer become accustomed to scare devices (noisemakers, reflectors, etc.) so that they are ineffective after a short time.

It should be acknowledged that the results of man's "progress" through this important range are anything but desirable for its wildlife residents. The initial damage has been done. None of the methods mentioned will completely solve the problem because the future of the deer herd in this area will naturally depend to a great extent on its winter range. However, deer kills by trains could and should be reduced substantially over the next few years.

EDITOR'S NOTE—John E. Firebaugh, 26, served as project biologist for a department study of the Libby Dam site from 1969 to 1970 (Deer-Railroad Evaluation). He is now game management biologist in Hamilton. He obtained a Bachelor of Science degree in fish and wildlife management from Montana State University, Bozeman, in 1967 and a Master of Science degree in 1969.

Who Pays For What?

by Art Whitney

Anglers have been paying for their fishing in Montana ever since the idea of unlimited, free fishing was abandoned early in this century. At that time limits and license fees were initiated to preserve fish stocks and to provide funds for management.

Management began mostly with planting fish. Much of the early stocking led immediately to better fishing, particularly when fish were released into new waters. **Memories of the early successes and the almost universal idea (probably carried over from banking) that one really should put something back for everything he takes out have given fish stocking a popularity that is somewhat out of proportion to its real value in fisheries management.**

Some of the stocking the public demands is ineffective and one very popular type of stocking costs more than the benefits it provides. This is the stocking of seven-inch and larger trout for immediate harvest. Under Montana's licensing system people who take several limits of these fish per year are having their sport heavily subsidized by the anglers who fish only for wild trout.

Why then is this type of stocking used in Montana? Is there any course of action that might put it on a more equitable financial basis? To answer these questions one must first understand why fish are planted.

Fishing can be improved through two different methods of planting fish—one, by making up for insufficient reproduction, and two, by making up for insufficient production.

The first situation usually represents good resource management. Where spawning areas are lacking, but habitat is otherwise good, a greatly improved fishery can be created by planting small fish. The situation occurs in many ponds and reservoirs and some lakes, but in only very few streams. Small fish are more economical to raise than catchables and they grow to become almost indistinguishable from their wild cousins. They are acceptable to most anglers. Stocking like this has provided the bulk of the fishery in places

EDITOR'S NOTE—Arthur N. Whitney, 46, is chief of the Fisheries Division of the Fish and Game Department in Helena. He has served as District Fisheries Biologist in Miles City and District Fisheries Manager in Missoula. In 1949 he received a Bachelor of Science degree in fish and wildlife management from the University of Minnesota, St. Paul, and then completed two years of graduate study. Presently he is president-elect of the Western Division of the American Fisheries Society and a member of the Montana Academy of Science.

like Canyon Ferry, Georgetown Lake, Big Horn River below Yellowtail Dam and most of the eastern Montana farm ponds that provide trout fishing. This stocking represents a good use of hatchery fish and produces fishing in areas where the fishery would otherwise be either non-existent or greatly reduced.

The other type of stocking, which is to make up for insufficient production of fish in a body of water, represents a questionable resource policy. **This attempt to provide instant fishing for the inexperienced angler who is not skillful enough to catch wild stream trout isn't really resource management. It could as well be done in a stock water tank on main street as in the Big Hole or the Madison Rivers and it is effective only for a short period.** Why then is it done? Because the public demands some stream stocking, and catchable stocking is the only effective method of improving the catch per hour for the inexperienced angler in a stream that has good natural reproduction.

Stream stocking used to be considered a means of replacing what fishermen took from the streams, comparable to replacing money drawn from a bank. It was thought that the fish which were caught had to be replenished or they would all be gone. **Trout in a stream are not at all like dollars in a vault.** They reproduce, grow and die. They reproduce in such large numbers that many little fish have to die each year because a stream has a carrying capacity for only a certain number, or pounds, of fish. Consequently, the little fish stocked in streams 10 to 20 years ago didn't make more big fish available to fishermen as it was hoped they would. **If any of the planted fish survived to be caught, they did so at the expense of some naturally spawned fish.** Early "maintenance" planting did nothing towards improving fishing in subsequent years.

The reproductive potential of fish is really overwhelming. A 100-foot section of good stream might support 20 adult fish. If this section held 10 pairs of spawning fish, and each female deposited 1,500 eggs, a total of 15,000 eggs would be in the gravel. It is not unreasonable to expect that 90 per cent of these eggs would hatch, producing 13,500 fry in an area which could support only 20 adult fish. This means that 13,480 would die before they reached adulthood. Most of the mortality occurs the first few months after hatching.

If planting little trout in an already occupied stream does no good, what kind of planting will improve fishing? More than 15 years ago the Fish and Game Department began rearing and planting trout the size that fishermen would consider "keepers." It was found that on a short-term basis, this type of stocking put more fish in the creels. However, it was also found to be very expensive and the results were short-lived.

On a statewide average it costs more than 20 cents to raise and plant each eight- to nine-inch rainbow trout. Even in the best areas, fishermen catch only about 40 per cent of the planted fish. Simple arithmetic shows that each fish creeled represents more than a 50-cent investment. **One limit of 10 planted catchable fish would represent $5.00 — more than the resident pays for his fishing license.**

If nothing else could be done to maintain or improve fishing, nearly all stream management funds would probably go into stocking catchable-sized trout. It is popular, the results are quickly realized, and even the guy who wants to catch only wild fish receives some benefit from it by having fewer fishermen in the areas where he wants to fish. However, the future of sports stream fishing depends upon the miles of trout streams, the quality of streams, the amount of water available to the streams and the quality of water. Competition for water with agriculture, industry and domestic sources, water pollution and destruction of stream habitat through dam building and other construction are the specters that haunt the shores of trout streams.

Stream planting as it is done today is effective and popular, and public demand will prob-

Many people enjoy the carnival-like atmosphere of roadside fishing for catchable-size planted trout. This type of fisheries management represents an effective, but expensive, way of providing easier fishing.

ably require that it be continued at its present level. It is easy to see why people who benefit most from catchable planting want it continued. One license fee pays for less than one limit of catchables. Thus, anyone taking more than one limit of these fish is having his sport subsidized by other anglers. It's really no wonder that fishermen who enjoy taking catchables keep asking for more. The answer to, "How many free fish do you want?" will always be, "All I can get."

What is surprising is that the people who prefer wild fish (or the fishing provided by small-fish plants) have not complained more about the catchable program. In effect the expenditures for raising and planting catchables represent a tax on these people from which they derive little benefit.

A much more equitable way that catchable planting could be financed would be to require that anglers who insist on having this type of fishing pay for it, or at least pay some additional fee beyond what is required to fish for wild fish.

Such an additional charge for fishing in areas planted with catchables is not a new idea. It is already in use in 13 states. Cost varies from $1.00 to $5.00 per season for all the 11 states using an annual stamp or permit. The other two states require a daily fee of $1.00. Such fees, of course, still do not make the angler who takes lots of catchables pay for all his fish. Only the commercial catch-out pond, which requires a fee of so much per inch or pound for each fish taken, does this. However, this additional fee makes the beneficiaries of the catchable stocking program pay for part of it. It also emphasizes the fact that catchable stocking requires expenditures above and beyond those of regular fishery management.

Montana could implement a fee program by requiring both a valid fishing license and a stamp, good for the same period as the license, to fish in waters posted as catchable-management areas. This would require legislative action and the fee would, of course, be set by the legislature.

Any major changes in the current stocking program would depend on the interest shown in the catchable program as demonstrated by the amount of support given to the new stamp sales. In 1970 almost 615,000 catchable-sized trout were planted for immediate harvest in 98 streams and 69 lakes, ponds and reservoirs. About 8.3 million other salmonids (mostly small-sized rainbow and kokanee) were also planted in several hundred other waters, either as new introductions or to supplement natural reproduction. If the stamp program was adopted, the areas where the stamp would be required would be posted and publicized.

If the money derived from the new stamps came close to financing the catchable production, it would probably continue at about the same level. The program would be built up or reduced depending on its financial support. If funds from the new stamps warranted a larger program, then expansion of catchable production would have its built-in financing and would not detract from other programs of more lasting benefit. On the other hand, if funds from the stamps fell far short of supporting the present program, catchable stocking would be reduced and production facilities would be switched from catchables to small fish for lake and reservoir planting. Since any reduction of large fish production frees facilities for production of many more small fish, our reservoir and lake stocking capability would be materially increased.

In any event, the total income from catchable stamps would free other dollars for more important long-range programs such as habitat protection and improvement. Some income could be used to evaluate certain regulations for quality fishing areas. Restrictions such as shorter seasons, size limits and reduced bag limits are frequently requested by anglers who want higher quality fishing — that is, a better chance of taking a large fish. The restrictions have not been added because no one knows if they would have the desired effect under Montana's relatively low fishing pressure. They should be evaluated.

Admittedly, those wanting a chance at more large fish (at the expense of reducing the total fishing opportunity) represent a special interest group. However, their request is certainly as valid as the request of the special interest group which now has instant fishing provided by the catchable program.

So who pays for what? All anglers pay for all fisheries management costs through their license fees, and anglers are quite equal in sharing the benefits from most management measures—operations such as habitat preservation and improvement, access development and stocking small fish in lakes and reservoirs. But one group, those who demand easy, instant fishing at the roadside, are having their sport heavily subsidized by anglers who don't enjoy this type of fishing. A special fee requirement to participate in this particular public recreation program would provide a much more equitable distribution of fishery management costs.

This scene on the Big Salmon River in the Bob Marsh Wilderness exemplifies the true value of wilderness fishin Under present license requirements, fishermen respondi only to the lure of the wary, wild trout are paying pa of the high cost of raising catchable-size trout f roadside fishing. (F&G photo by Otis Robbins)

THE FAST ONE

SPEEDING ITS W

Reputed as the fastest of all birds, the peregrine falcon, (Falco peregrinus) stands out as a truly unique member of the bird world. If protective measures are not enacted and enforced immediately, this winged speedster could easily disappear forever.

THE PEREGRINE FALCON

story by Vincent Yannone
photos by Jay Sumner

The peregrine falcon is suffering a worldwide population decline so severe than conservationists fear its extinction. It ranks are so low that it has earned a place on the list of endangered species of the Bureau of Sports Fisheries and Wildlife. Unless it receives assistance soon, the peregrine falcon may join the long list of animal species that man has forced into extinction through indifference and carelessness.

STATUS IN MONTANA

Ornithologist James H. Enderson, who made studies of the peregrine falcon in the intermountain region of the West in 1964, estimates the population in Montana to be about 25 pairs.

AY TO EXTINCTION?

The Montana Fish and Game Commission after reviewing various sources of information felt that the peregrine falcon, as well as the prairie falcon, should be protected in Montana. On May 14, 1970, a closed season was adopted for both birds. The order states:

By order of the Montana Fish and Game Commission, it is prohibited for any person at any time to hunt, capture, kill, possess, purchase, offer or expose for sale, transport or cause to shipped or transported any Prairie Falcon (Falco mexicanus) or Peregrine Falcon (Falco peregrinus).

This measure will help preserve these birds in Montana. However, if the proper steps toward preservation and protection are not adopted and practiced throughout the United States, the peregrine falcon may become extinct.

CAUSES OF THE DECLINE

Even if total protection for the peregrine is practiced world-wide, preservation will be difficult. Man has polluted his environment with toxic chemicals such as mercury, lead and chlorinated hydrocarbon pesticides which have detrimental effects on wildlife, including the peregrine falcon. These chemicals affect reproductive processes which are necessary for the propagation of the species.

Pesticides have a tendency to concentrate in the fatty tissues of animals. Bird- and fish-eating hawks may accumulate especially large concentrations of pesticides because of their position in the food chain (see January/February issue of MONTANA OUTDOORS, pp. 11-17). This applies, of course, to the peregrine falcon.

At present, no sufficient data exists to show the effects of pesticides on peregrine falcons. However, according to University of Wisconsin Ecologist J. J. Hickey, pesticides have led to widespread reproductive failures in the peregrine. Studies on other raptors (birds of prey) show that pesticides cause a failure to lay eggs or a thinness in egg shells leading to breakage. The same, of course, would be true for peregrine falcons. The effect of pesticides combined with other environmental stresses would certainly have a serious impact on peregrine populations.

The peregrine fledgling.

The gradual disappearance of peregrines in the Northwest is blamed not only on pesticides but on local climatic conditions. Ornithologist Morlan W. Nelson, who made studies of the peregrine population in six northwestern states from 1939 to 1965, has pointed to a gradual change in climate since 1876 as a possible cause of the peregrine's disappearance. He states:

It is estimated that 80 to 90 per cent of the older sites in Utah, Idaho, Oregon, western Wyoming and western Montana have been deserted by this species, and it is suggested that the peregrine population shifted north and a lesser degree to higher elevations in the same areas to compensate for the climatic change that has taken place.

EDITOR'S NOTE—Vincent D. Yannone, 29, is an educational representative for the department's Information and Education Division in Helena. He formerly served as a teacher of physics, chemistry and biology in Philadelphia, Pa., and as wildlife biologist for the Montana Cooperative Wildlife Research Unit in Missoula. He was graduated from Adams State University at Alamosa, Colo., in 1964 with Bachelor of Science degrees in chemistry, education and pre-medicine. In 1970 he received a Master of Science Teaching degree from the University of Montana, Missoula.

falcons at home

The climatic change is in the form of less rainfall and a rise in average temperatures. The swamp areas surrounding the thousands of lakes and ponds without outlets in the intermountain West have been significantly reduced, and there has been a drop in the nesting populations of shorebirds as their habitat has disappeared. A similar pattern of decline has occurred in the peregrine population since 1930. The decline of both types of birds in the same ecologic areas seems to be worth studying, especially since shorebirds are prey for peregrine falcons and the decrease in shorebirds would reduce the food available to the peregrines.

Another factor brought out in Nelson's work is the direct effect of the rise in temperature on peregrine populations. When spring temperatures rise there is less cloud cover. The direct rays of the sun on birds of prey just out of the down and into feathers can kill them in less than one-half hour. The temperature must be near 90 degrees for this to occur. However, this temperature is frequently reached in May and June below 6,000 feet. Peregrines are far more sensitive to heat and cold than most birds of prey.

The decline of peregrine populations seems to be a definite trend. No statistics document this presently, although studies are in progress. A change in climate may cause a shift in population to the north. This shift may also take place as an elevational change. Either shift would lead the peregrines to cooler temperatures. Since 1965 there has been a trend toward temperature conditions similar to those prior to 1876. If this is the case, Nelson's theory will have some merit.

DISTRIBUTION

Peregrine falcons have been recorded in all major regions of the earth except Antarctica. Because of the falcon's high breeding densities in Western Europe, scientists believe the peregrine originated in the Old World. It was never an abundant bird, but it was far more common than it is today.

In North America its breeding territory extends from northern Alaska down to Baja, California and Mexico. Wintering grounds range from southern British Columbia through the Pacific states and into southern Colorado and Arizona.

Certain populations of peregrines tend to migrate long distances. However, many populations tend to be sedentary in areas where winter food is abundant. There may be some altitudinal movement in some mountain nesting populations, but not enough research has been done to prove or disprove this theory.

IDENTIFICATION

Peregrine falcons vary in body size and color so that a trained ornithologist is able to distinguish subspecies. Estimates of the number of subspecies vary with authorities. Dementier, a noted ornithologist (1951), claims that there are 22, while Vaurie (1965), also an expert on ornithology, believes that there are 12 to 13 subspecies.

The peregrine falcon can be distinguished from a hawk by its sleek, streamlined body, its long pointed wings and long tail. In contrast a hawk has a somewhat compact body, broad, rounded wings and a much shorter tail in comparison to its body length. Eagles, of course, are much larger than hawks and falcons.

Their different forms in flight also distinguish hawks and eagles from falcons. Hawks and eagles fly with slow, rhythmic wing strokes and seem to float over long distances with little movement. Falcons are built for speed, especially when diving, and rarely maintain sustained flights. Their wing strokes are rapid and shallow and may be compared to those of a pigeon. Their size is comparable to that of a crow.

Peregrine falcons have large black eyes and a notch near the tip of the beak giving them a double hooked or toothed appearance. They range in color from light brown in the immature stages to a slate grey or black dorsal surface in adult birds. Young falcons have dark striping on the breast, while adult birds have light breasts with bars or spots. Other adult characteristics include white throat and upper breast with slight banding in the tail. The best field marks are the dark, almost black head cap and the facial patterns. The peregrine is the only large falcon to sport black moustache markings running from the eye onto the throat.

HUNTING

The peregrine is a skillful hunter. It is the fastest bird in the world, capturing its prey by direct pursuit in open terrain. In the air it will fly high over its prey and swoop down on it at incredibly high speed. Some experts on the peregrine claim that it can exceed speeds of 150 miles per hour. The peregrine strikes at the prey with its feet rather than grasping it, then either catches it in mid-air or follows it to the ground. This method differs from that of other raptors, which use a quick dart or short sprint to capture their prey.

Variations exist among individual peregrines. The most common variables are agility and age of the bird. Young birds are quite unskillful when first leaving the bonds of their parents.

FOOD

The diet of peregrines varies with location and prey available. Falcons along the coast take gulls as their principal food while those in inland waterways depend on waterfowl. This is where their common name, "duck hawk," originated. Work done by various researchers shows the domestic pigeon to be a favorite prey of the peregrine when it is available. Rodriguez de la Fuente (1954) concluded that domestic and feral pigeons constitute about 75 per cent of the Spanish peregrine diet. This great love for pigeons has led the bird to take residence in some heavily-populated cities containing a large pigeon population. The peregrine also preys on doves and larks and a small number of mammals which are considered to be insignificant in their diets.

NEST

Peregrines have been known to nest in many sites. However, throughout the world cliffs are their prime sites for nesting. Their dependency on this nesting habitat has caused a reluctance to breed in certain regions of the world where cliffs are not available.

Peregrines will use igneous and sedimentary rock cliffs but they are particularly fond of limestone cliffs, which offer both nesting sites and roosting areas. Igneous and sedimentary rock cliffs do not tend to offer these night roosting spots. The nest consists of a shallow depression in the ground, crumbled rock, mats of vegetation or remains of prey. A nesting site may be found on an open, exposed ledge, but usually the birds seek the shelter of shrubs or trees.

The tendency of the peregrines to lay eggs in other birds' abandoned nests varies widely between regions. In areas where there is a high population of birds, this habit is more common. Peregrines may use red-tailed hawks', golden eagles', buzzards', herring gulls' and even ravens' nests. Perhaps this habit is more the result of availability than any other factor.

The number of different nesting sites used by a single pair of peregrines will vary over a number of years. These alternate nesting sites

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complicate the task of censusing a peregrine population.

The use of nests built by other birds represents the most successful attempt of peregrines to adapt to the scarcity of cliffs. In North America records of tree nesting are rare. There are 10 definite records of birds nesting in large holes of great trees. The great bulky nest of eagles and osprey may attract peregrines much as the open ledges of cliffs. The most venturesome peregrines have tried skyscrapers or public buildings as nesting sites. The birds' inability to adjust to man's environment and their reproductive failure in these sites has led to failure in this endeavor.

CLUTCH SIZE

An average clutch size of two or three has been determined for North America. In addition to geographic differences other variables such as age, renesting clutch size and the genetic characteristics of individual females play an important role.

Renesting of peregrines in areas where the breeding season is short is highly unlikely. This would be the case in the Arctic region. Peregrines can best be counted on to renest if their clutches are lost early in incubation.

The peregrine eggs are 2.1 by 1.7 inches and are covered with blotches of chocolate brown against a cream-colored background. The overall appearance of the egg is brown.

MORTALITY

The largest numbers of young peregrines are fledged in geographic areas where the clutch sizes are largest. Many eggs never mature into fledglings. The mortality rate of the eggs may range from zero to as high as 24 per cent in the United States.

Another critical period comes when young birds leave the care of the adult birds. At this time the young birds must search and kill for themselves. Because of their lack of hunting experience and vulnerability to enemies many starve or are killed.

Studies on other avian populations show a high rate of mortality in reared young before they reach maturity. This is also assumed to be true for the peregrine. The high mortality rate of young birds is offset by a low adult mortality. In any given species a balanced population is reached by taking into account the mortality rate, the productivity of the breeders and the non-productivity of the nonbreeders.

FALCONRY AND FALCONS

Falconry is the art of training any of the species of wild hawks or falcons and hunting game with them. Training essentially consists of teaching the bird to return to its owner after flight. The appeal of falconry lies in the excitement of the bird's flights and chases.

Hawks are birds of prey and it is their nature to hunt. Falcons make up a particular group of hawks whose spectacular powers of flight and response to training make them ideal for falconry. Until it became illegal to capture and possess them, peregrines were the most popular species for this sport. (Those falconers possessing peregrines prior to the 1970 order protecting the birds are allowed to keep them under permit. They may not capture new peregrines.)

Falconry is so old that no one can say where it originated. It is believed to have originated in Egypt and Mongolia as a sport of kings. Falconry reached its zenith in the Middle Ages. The decline of falconry in Europe from its peak of popularity came with the invention and use of gunpowder. In addition, social changes of the era affected the use of the people's leisure time. However, falconry never died out in the countries where it once flourished because of small dedicated groups of followers.

Falconry was established in America in 1938 by a small group of falconers led by Colonel R. Meredith of Media, Penn. He is known as the father of falconry in the United States. The sport has continued to grow since its initiation. In 1965 falconry was established in most states and in Canada.

It takes several years to learn the fundamentals of falconry, even with the guidance of an expert. It is not a sport one learns from books. Time is required to trap and train the hawks. Once a bird is trained, at least an hour a day is needed for handling, feeding and exercising it. Few persons will put forth this effort.

Falconry and conservation of the birds of prey are inseparably linked. Falconers are responsible for much of the present knowledge about peregrine populations and their decline. They contribute time and money to help insure the peregrine's survival. While it is true that in the past falconers harvested some birds of breeding age, they have contributed much of the research on captive breeding of peregrines. A few successful breedings of peregrine falcons have taken place so far and falconers as well as conservationists continue to search for more effective ways of breeding peregrines in captivity.

Falconers as well as conservationists should be the first to urge the total preservation of a species of bird that is threatened with extinction. There are several ways in which preservation of the peregrine may be aided. Building up the breeding stock is one. Another is by protecting the bird in all areas through adoption of closed seasons on peregrines, such as that recently enacted in Montana. Funds available for wildlife research generally are used for species valuable to the sportsman. Equal emphasis must be placed on those species which are as valuable in other ways.

Man must not crowd the peregrine out of its natural habitat. He must learn to control his environment without polluting it and endangering not only all wildlife, but perhaps himself as well.

THE PEREGRINE FALCON

Classification: Class—Aves
Order—Falconiformes
Family—Falconidae
Genus—*Falco*
Species—*peregrinus*

Status: Endangered

Characteristics: Long, pointed wings and long tail. Rapid wing beats. Sleek, streamlined body, slate grey dorsal surface, white breast extensively spotted and barred with black. Black head cap and moustache markings running from eyes down onto throat. Beak notched. Comparable to the crow in size.

Estimated Numbers: In Montana — 25 breeding pairs.

Breeding Potential: 2 to 3 eggs per set, hatching success low. Renesting unlikely.

Reasons for Decline: Strongly suspected reasons include the cumulative effects of pesticide poisons obtained from the tissues of prey. Climatic changes. Molesting of nests by man and shooting.

Protective Measures: Legislation to protect this bird in other states in addition to Montana. The pooling of all information concerning mortality. Captive propagation to bolster wild populations. Increased research.

management makes sense

EDITOR'S NOTE—It goes without saying that many articles in MONTANA OUTDOORS involve the sound management of our fish and game. Like most other sciences, wildlife management can become complicated to the point where only those specifically educated in the field can understand it. Since the vast majority of our readers are not educated in fish or game management, we put together this short article with the purpose of making future articles easier to understand. First we'll define some basic terms in the language of wildlife management and then we'll refer to a classic example of mismanagement.

HABITAT—Every living thing from yours truly to the lowest of microorganisms has a home or living area, called habitat, where all its life essentials are found. The habitat must supply the animal with four basic necessities — food, cover, water and living space. Habitat stands as the single most important factor in any game population. Conservation efforts will have little effect without a foundation consisting of a stable, productive habitat.

CARRYING CAPACITY — Every habitat has a certain level beyond which it cannot support a game population. The abundance of the various life essentials sets this level. If the population rises above carrying capacity, a surplus forms and must somehow be removed. If the population is not reduced, the extra animals will deplete their habitat and, in turn, lower the carrying capacity for succeeding generations.

Winter brings on the nitty-gritties of survival for most game animals. (F&G photo by Keith Seaburg)

BIOLOGICAL SURPLUS — Animals produced in excess of the carrying capacity are labeled as surplus and must somehow be removed. If left unchecked, a large surplus will quickly lead to a drastic reduction of numbers because of diminished resources.

REPRODUCTIVE POTENTIAL — The maximum rate at which a species can increase if unchecked is termed the reproductive potential of that species. Most game animals have a very high reproductive rate. Without certain factors which limit this rate, any game species can easily produce more young than its habitat can support. This uncontrolled population growth raises a game population beyond the carrying capacity of its habitat and creates a biological surplus.

LIMITING FACTORS— These forces work to keep a game population at or below the habitat's carrying capacity. A brief list of limiting factors would include disease, starvation, water shortage, severe weather, competition, predation and losses from hunting and fishing. The number of animals existing in a certain habitat at any one time depends on the balance between reproductive capacity and drains upon the population.

These five basic terms make up the language of wildlife management. Without the presence of certain **limiting factors,** a game species with a high **reproductive potential** can easily reach and surpass the **carrying capacity** of its **habitat** and create a **biological surplus** which must be removed. In most cases, overpopulation results in a lower

carrying capacity and a drastic reduction, by limiting factors such as disease and starvation, in the original size of the population. **The greatest threat to a game species is overpopulation.**

The importance of these principles becomes easier to understand when they are applied to a famous example of game mismanagement.

The Kaibab National Forest in northern Arizona hosts a mule deer herd very similar to those found in other Rocky Mountain states, including Montana. The only difference is that this deer herd has already demonstrated what can happen when nature's tools are misused and her warnings ignored.

In 1906 nearly 4,000 deer resided in the area. Supported in part by the deer herd, a fairly abundant predator population consisting of mountain lions, coyotes, bobcats and a few grizzlies and wolves also frequented the area. Man had arrived on the scene so that limited numbers of cattle and sheep also obtained their livelihood from this range.

In the same year, President Theodore Roosevelt proclaimed the Kaibab region a federal game preserve. It can be guaranteed that President Roosevelt was well-meaning in creating the refuge on the theory that protection always meant good wildlife management. However, what resulted could hardly be called good management.

After the creation of the refuge, more protection was authorized in an attempt to increase the deer population. First, all livestock was moved out in order to leave more food for the growing deer herd. This action did benefit the herd. More food and the lack of competition with livestock increased the carrying capacity of this range and allowed the deer herd to increase accordingly.

Next, trappers were put to work to remove natural predators. They accomplished their task efficiently and exterminated the grizzly and wolf and greatly reduced the mountain lion and other predators. As a final act of protection, hunting was no longer allowed on the refuge.

The groundwork had been laid. Now the Kaibab hosted a deer herd with very few natural enemies, complete protection from hunting and extra food from the absence of livestock. The population responded accordingly . . . it exploded!

At first observers were overjoyed at the increasing numbers. Deer were everywhere. A tourist could count hundreds on a trip through the refuge. The range was being forced to support a deer herd above its carrying capacity. Instead of acting immediately to remove the surplus, game managers allowed the herd to increase until detrimental effects on the habitat became evident.

Shrubs began to take on a "hedged" appearance as though a troop of gardeners was at work. Aspen groves exhibited a definite browse line where deer had stripped every leaf and twig as high as they could reach. Timber reproduction began to suffer. Seedlings were sought out and eaten by the always-hungry deer herd. The U.S. Forest Service finally recognized the problem and sounded an alarm for an immediate reduction in the herd.

Because the thought of "too many deer" was so unbelievable to the American public, the U.S. Forest Service reports were ignored, leaving the deer herd destined for disaster.

When the range was all but destroyed, Mother Nature took care of the situation in a not-so-motherly manner — MASS STARVATION.

Between 1906 and 1924, while the deer population was strictly

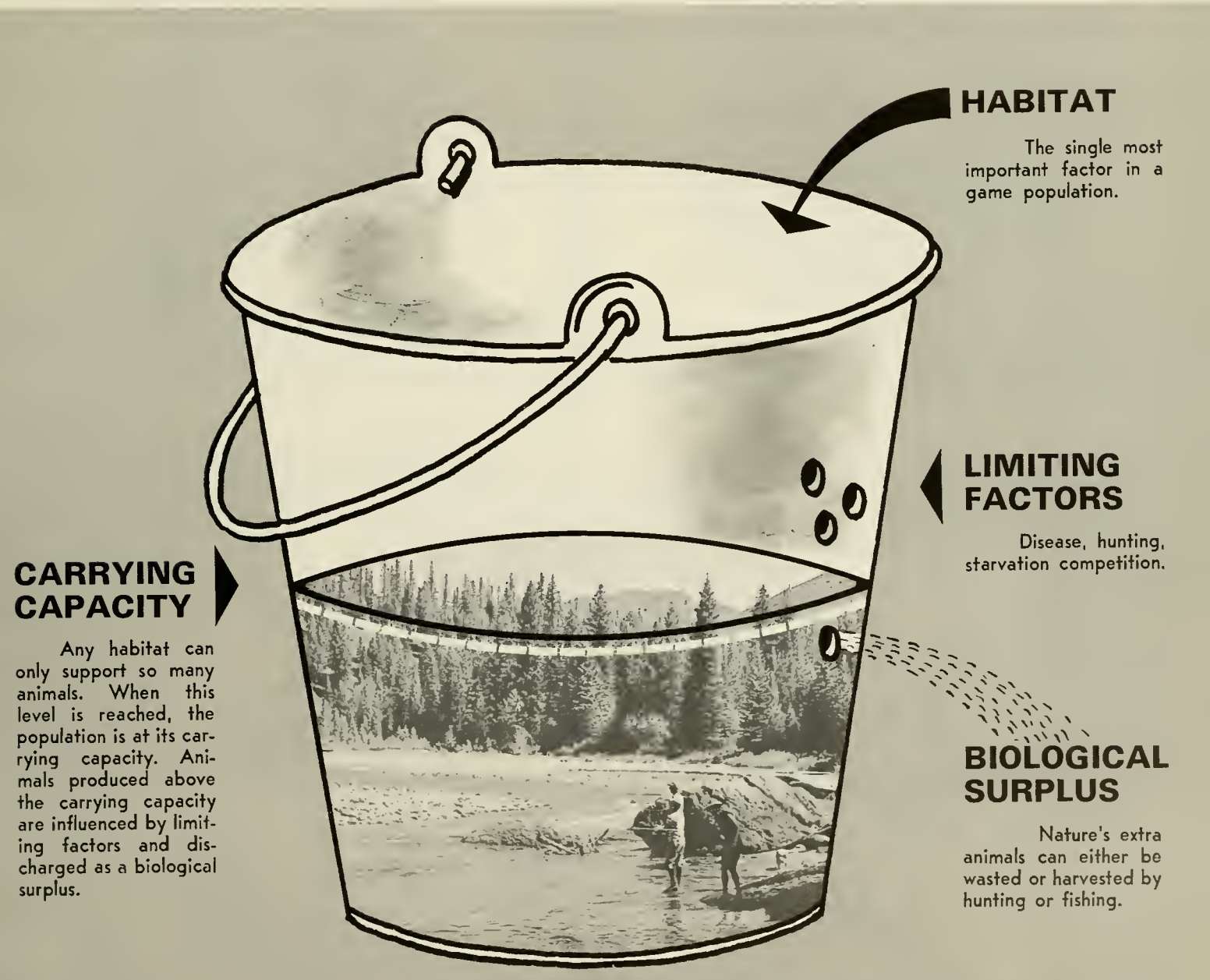
Many Montana elk herds have more than enough summer range and not enough winter range. (F&G photo by Roger Fliger)

protected, the herd mushroomed from 4,000 to 100,000. In the next six years 80,000 deer — 80 per cent of the population — starved. Before 1940 another 10,000 met the same fate. The rest survived.

Approximately 90,000 deer had been protected to death.

If a choice had been offered, would these deer have taken a hunter's bullet or a swift attack of a mountain lion instead of months and even years of gnawing hunger ending in starvation?

This lesson should not be limited to deer. With a few modifications it can be applied to any game animals whether they be big game or small game, to any game birds whether they be pheasants, grouse, ducks or geese, or to any fish whether they be game fish or non-game fish. In fact, it can apply in its strictest meaning to every living thing on this earth.


HABITAT
The single most important factor in a game population.
LIMITING FACTORS
Disease, hunting, starvation competition.
CARRYING CAPACITY
Any habitat can only support so many animals. When this level is reached, the population is at its carrying capacity. Animals produced above the carrying capacity are influenced by limiting factors and discharged as a biological surplus.
BIOLOGICAL SURPLUS
Nature's extra animals can either be wasted or harvested by hunting or fishing.

SAGEBRUSH

AND WILDLIFE

ARTWORK — VERN CRAIG

YOU WON'T BELIEVE IT!

by Bart O'Gara, Ph.D.

An often-quoted fallacy refers to deer as dainty and fragile mammals that find it difficult to survive in nature's cruel world. In reality they are remarkably hardy big game animals. An incident which occurred during the 1969 hunting season in western Montana demonstrates that deer are one of nature's most rugged and adaptive wild creatures.

On Nov. 5, 1969, Lawrence Perrine of Milltown, Mont., shot a three-year-old white-tailed buck (**Odocoileus virginianus**) in the Gold Creek area of the Blackfoot River in Missoula County. The buck appeared to be in very good condition and sported a four-point rack. When Perrine eviscerated the animal, he noticed a hard object in one lung. When he tore part of the lung away and found the end of a stick, he called the Wildlife Research Unit at the University of Montana, Missoula.

A subsequent examination disclosed that the stick had entered the rib cage through the right side and had fractured three ribs. The end of the stick which entered first had been burnt and was 2 and 7/8 inches in circumference. The other end, which apparently had been broken after the penetration, was 3 and ¼ inches in circumference. The stick, 10 and 3/8 inches long, went through the right lobe of the lung, the diaphragm, and more than half of the right lobe of the liver. External evidence of the injury was almost non-existent except for a small scar that could only be observed when the hair was parted.

The actual size of the stick— 10 and 3/8ths inches.

At the time of the kill the stick was encapsulated by dense, fibrous tissue. The stick remained completely dry except for about two inches of the burnt end which was surrounded by a small amount of clear yellow fluid inside of a capsule. No other sign of infection existed. All three ribs had healed in a slightly irregular manner leaving a noticeable knob where the fracture occurred.

How could a deer shrug off an injury of this extent? The answer lies in the tremendous adaptive qualities of wild animals. If the stick had been pulled out of the lung, internal bleeding might have been fatal, but the stick remained in the body cavity so that the deer's internal organs were forced to adapt to it.

This particular incident should leave many hunters wondering about the effectiveness of their rifles and bows when a deer can survive an injury like this in good health.

EDITOR'S NOTE—Bart W. O'Gara, 48, is assistant leader of the Montana Cooperative Wildlife Research Unit and a lecturer in zoology and forestry at the University of Montana, Missoula. He received a Bachelor of Science degree in fish and wildlife management from Montana State University, Bozeman, in 1964 and a Doctor of Philosophy degree in zoology from the University of Montana in 1968. Before obtaining his degrees he served in the Navy for 20 years and retired with the rank of Master Chief Petty Officer.

THE PAST COMES TO LIFE

by Norman Guyaz

Among Montana's many treasures is an abundant and diversified selection of historic landmarks. The state's past can be traced in the many old buildings and forts, ghost towns, battlegrounds, mines and archaeological sites which survive from earlier times.

One may ponder the question of why an old building or battlefield should be preserved. One reason is that these historic sites have the capacity to bring the past to life. Although a knowledge of history may be gained from various sources — history books and literature, visits to historical museums and libraries, conversation with one who has experienced a historic event, attendance at historical dramas — only through a visit to a historic site can one mentally reconstruct the past in the very structures or sites that existed when history was being made.

A visit to a historic site reinforces what has been earlier learned about the past. Studying a

The west side of Pompey's Pillar. (F&G photo by Max Stone)

A church at Bannack. (photo by Norman Guyaz)

Fort Logan. (photo by Norman Guyaz)

St. Mary's Mission. (photo by Norman Guyaz)

Clark's Mansion. (photo by Norman Guyaz)

battle terrain as a soldier must have done, walking through a mansion or a miner's cabin, handling the artifacts of earlier times, all these can help recapture the atmosphere of the past as no history book can.

A glimpse of history may even help one understand the present, for life today has been irrevocably shaped by events of the past. Hopefully, a more meaningful existence can be obtained through a clearer understanding of history.

Throughout Montana the remnants of the past are abundant, but like many of Montana's resources, they are threatened by man's constant drive for change and progress as well as by the elements. Montanans must recognize the value of these historic sites and strive for their preservation. Montana's rich history and her vast array of physical relics provide an enormous potential for a program of preservation and restoration.

Important progress in historical preservation was made on a nationwide scale when in 1966 the National Historic Preservation Act (P.L. 89-665) was passed. This act expanded the preservation concept to historic places of state and local as well as national significance.

In the past, one of the main obstacles to Montana's preservation projects was lack of funds. The National Historic Preservation Act pledged federal matching grants for preservation of significant historic sites. In addition it authorized an expanded national register or listing of historic properties worthy of preservation and provided a measure of legal protection for registered properties.

Also in 1966, the governor of Montana designated the Fish and Game Department as the official state agency to carry out the provisions of the newly enacted P.L. 89-665. The chief of the Recreation and Parks Division, currently Wesley Woodgerd, is the chief liaison officer. From the National Historic Preservation Act originated the present state preservation program, which is still in its infancy.

Inherent in any preservation program is the obligation for an honest portrayal of the past, for only in this manner will a site be meaningful. Only by striving for authenticity in restoration and preservation can a realistic concept of the historic environment and a closer feeling for the past be obtained. Throughout the official statewide preservation program the concept of quality and integrity is of primary concern.

What features make up this preservation program? It consists of four interrelated segments: an inventory or listing of historic sites,

a nomination process to place worthy sites in the National Register of Historic Places, a statewide comprehensive historic preservation plan to serve as a guide for preservation in Montana, and the actual preservation and restoration projects themselves.

An inventory of historic sites in Montana is contained within the official state preservation plan compiled by the Recreation and Parks Division. More than 300 historic, architectural, archaeological and cultural sites of local, state or national significance are included.

Using the inventory, selections are made of sites to be nominated to the National Register of Historic Places. Resulting from the 1966 National Historic Preservation Act, the National Register identifies properties worthy of preservation for their historic value. The National Park Service maintains the register, which currently lists 31 sites in Montana as historic landmarks. When these sites are named to the National Register, they become eligible for federal matching grants for restoration and preservation projects.

Obviously not every site commemorating a historic event or person, regardless of importance, can be recognized and preserved. An effort is made to include only those sites and structures that are significant in local, state or national history, archaeology, culture or architecture. A historically significant event is defined as one which was of sufficient importance that it became a turning point or had a major influence upon subsequent events. In architecture, culture or archaeology, a site that represents an era or field of endeavor, or yields information important in prehistory or history, may be considered significant. In any event and regardless of the location of the site — for preservation must also be nationwide and statewide in its scope — significance is the key to selection of sites to preserve.

Before sites are nominated to the National Register they must have the approval of the Governor's Advisory Committee for the Preservation of Historic Sites to assure that only the most worthy of properties are recommended. The Governor's Advisory Committee also reviews all projects on historic properties before submission to the National Park Service and has final approval of the state historic preservation plan.

The Montana Historic Preservation Plan is the state's official document concerning historic preservation. Prepared under National Park Service guidelines, it affirms preservation goals through a philosophy of preservation, and it provides the already mentioned inventory of historic sites from which to select properties worthy of nomination to the National Register. Major problems in preservation are identified, needs are determined and possible solutions are offered. In addition, a tentative program for preservation is predicted. The current plan has been accepted by the National Park Service, qualifying Montana preservation projects for federal assistance.

Because of the rudimentary nature of the state preservation program, no new projects have yet been undertaken. Once the program gathers momentum, projects will be submitted to the National Park Service for approval. These projects may be of two general types. First, the state may acquire historic properties but only if they are not in public ownership. Second, the state may undertake a development project on public or private land but only if the property is in non-federal ownership. Development projects may involve protection, rehabilitation, restoration, reconstruction or a combination of the above, and may be sponsored and administered by state agencies, counties or towns.

With a sound program for preservation, with adequate funding and public support, and with the assistance of the National Park Service, much can be accomplished in the years to come to preserve for future generations an invaluable and irreplaceable part of Montana's heritage.

EDITOR'S NOTE—Norman Guyaz, 32, received a Bachelor of Science degree in forestry from the University of Maine at Orono in 1965 and a Master of Business Administration degree in 1966. He is now a recreation planner for the Recreation and Parks Division in Helena. Before joining the Fish and Game Department he taught high school science in Farmington, Me., and was a cartographic editor for The National Survey in Chester, Vt.

MONTANA'S HISTORIC LANDMARKS

1. BANNACK HISTORIC DISTRICT

Bannack was the site of the first major gold discovery in Montana in 1862 and the first territorial capital in 1864. Abandoned since 1938, Montana's oldest town is a prime example of historic frontier camps and mining towns. Most buildings are of wood frame and log construction typical of the era. (21 miles west of Dillon off U.S. 91)

2. BEAVERHEAD ROCK

Beaverhead Rock was the first landmark recognized by Sacajawea as the Lewis and Clark Expedition neared the land of her people, the Shoshoni. She guided the expedition through the territory and helped make contact with the Shoshoni, who furnished supplies and assistance to the travelers. (approximately 14 miles south of Twin Bridges on state highway 41)

3. BIG HOLE NATIONAL BATTLEFIELD

On Aug. 9-10, 1877, Colonel John Gibbon fought five bands of Nez Perce Indians who were attempting to escape to Canada after fleeing from Idaho. Gibbon's men were outnumbered but his attack weakened the Nez Perce. The Indians were later forced to surrender within 30 miles of their destination. (12 miles west of Wisdom on state highway 43)

4. BUTTE HISTORIC DISTRICT

Butte was the site of early gold, silver and—most important—copper mining in Montana. The 1880's and 1890's were highlighted by the wars of the legendary "copper kings," William A. Clark, F. Augustus Heinze, Marcus Daly. Butte is still an important mining district, producing copper, lead, zinc, silver and gold.

5. CAMP DISAPPOINTMENT

The northernmost point reached by the Lewis and Clark Expedition was Camp Disappointment, established by Lewis and nine of his men during a side trip on July 23, 1806. The purpose of the trip was to determine if the Marias River extended north of the 49th parallel, and to determine if the headwaters of the Marias and Saskatchewan Rivers were in close proximity. (12 miles northeast of Browning on the Blackfeet Reservation)

6. CANYON CREEK LABORATORY OF THE U.S. PUBLIC HEALTH SERVICE

Canyon Creek Laboratory was operated from 1921-1928 and was the center of important research and discoveries related to tick-borne diseases. The site of the laboratory was an abandoned brick schoolhouse which has since been made into a museum. (Hamilton)

7. CHIEF JOSEPH BATTLEGROUND OF THE BEAR'S PAW

This was the site of the surrender of Chief Joseph and the Nez Perce on Sept. 30, 1877. After a journey of nearly 2,000 miles the Indians were captured by Colonel Nelson A. Miles only 30 miles from their destination. It was here that Chief Joseph, tired and disheartened, made his famous speech of surrender: " . . . From where the sun now stands, I will fight no more forever." (16 miles south of Chinook off U.S. 2)

8. CHIEF PLENTY COUPS MEMORIAL

This monument is a memorial to the friendship between the early settlers and the Crow Indians. Chief Plenty Coups, born in 1848, was leader of the Crow Nation and an outstanding warrior in his younger days. He was a wise leader who quickly adopted the ways of the white man. His ranch home, store and gravesite are located here. (35 miles south of Billings near Pryor)

9. CLARK (WILLIAM A.) MANSION, BUTTE

The former mansion of copper king and politician William Andrews Clark has been preserved as it was in the 1880's. Period furniture, including a few of Clark's original pieces, has been used to furnish the mansion for public viewing.

10. CUSTER BATTLEFIELD NATIONAL MONUMENT

The annihilation of Lt. Col. George Custer and his troops by Sioux and Cheyenne Indians took place here on June 25-26, 1876. The battle was precipitated by shrinkage of Indian land and the federal government's demand that the Indians be on reservations by Jan. 31, 1876. Instead they rallied around Sioux leader Sitting Bull and killed Custer and his command of about 225 men. (15 miles south of Hardin on Interstate 90)

The site of Custer's Last Stand. (photo by Norman Guyaz)

Beaverhead Rock with the Big Hole River in the foreground. (F&G photo by Harley Yeager)

11. FORMER EXECUTIVE MANSION, HELENA
The former home of Montana's governors until 1959 was completed in 1885 at a cost of $85,000. It is in the process of being preserved as it was in the 1880's.

12. FORT BENTON
At Fort Benton are the remains of a former fur-trading fort and an upper Missouri River steamer port that flourished in the 1800's. The fort's real prosperity dates from 1859 when the first steamboat arrived. The discovery of gold in 1862 made Fort Benton an important overland connection with the river steamers. After the railroads probed westward, Fort Benton and its river traffic declined rapidly.

13. FORT LOGAN AND BLOCKHOUSE
Fort Logan, established in 1869, was used by the army to protect early mining towns in the Belt Mountain area. It was originally called Camp Baker. The blockhouse has a rather unusual design for buildings of that type. (approximately 20 miles northwest of White Sulphur Springs)

14. FORT OWEN
Fort Owen was a trading post built by Major John Owen when he arrived in the Bitterroot Valley in 1850. It is Montana's oldest settlement and the site of the first cattle herd, first attempt at irrigation and first school in the state. The fort was constantly menaced by Blackfeet Indians. Discovery of gold in the 1850's funneled people through the Bitterroot Valley and the fort flourished. Hellgate (now Missoula) began to replace Fort Owen as a center of trade and commerce about 1865. (near Stevensville off U.S. 93)

15. FORT PECK AGENCY
Fort Peck was an army post dating back to the 1870's and was the site of the first attempt to place a hostile (Sioux) and a friendly Indian tribe (Assiniboine) on the same reservation. It was hoped that the peaceful influence of the Assiniboine would make it unnecessary to furnish the reservation with large numbers of troops. Today Fort Peck is the agency for the same reservation. (Poplar)

16. FORT UNION TRADING POST
Fort Union was an important early upper Missouri fur trade depot established in 1828. It afforded northern plains tribes their first extensive contact with the white culture. It marked the opening of John Jacob Astor's campaign to secure the region's trade for the American Fur Company. (11 miles southeast of Bainville on Montana-North Dakota Border)

17. GRANT-KOHRS RANCH
The ranch of John Grant, one of the founders of the cattle industry in Montana in the 1850's, was located here. Conrad Kohrs, one of the foremost "cattle kings" of the era, later purchased the property. He also helped form the Montana Stockgrowers Association. The original frame ranch house erected in 1862 is still standing. (edge of Deer Lodge)

18. GREAT FALLS PORTAGE
The Lewis and Clark Expedition in June, 1805, was forced to portage around the falls of the Missouri River here. They were the first white men to view the falls. The 18-mile, 31-day portage was one of the greatest ordeals endured by the expedition on its way to the Pacific. Dams have since been built at the falls. (southeast of Great Falls on U.S. 87 and 89)

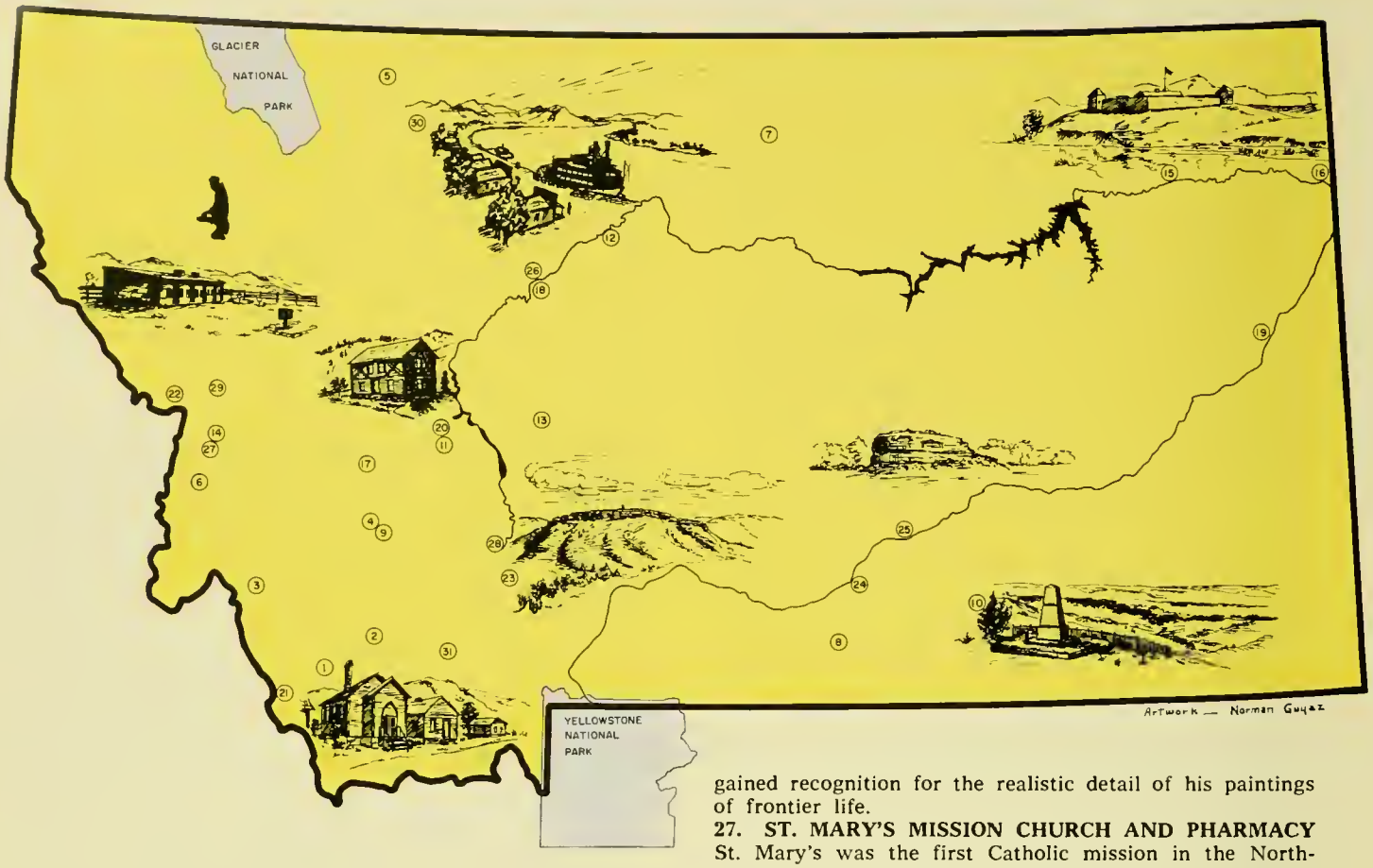
19. HAGEN SITE
Hagen Site is the location of a late prehistoric earth lodge village believed to represent a settlement of the Crow Indians before they became nomadic bison hunters. Partial excavations of the site in 1938 revealed a midden area of more than 10 acres. Storage pits, implements and human bones have been found on this farming site. (5 miles south of Glendive on secondary road)

20. KLUGE HOUSE, HELENA
The Kluge House, dating in the 1880's, is a rare example of the German "Fachwerkbau" architecture found in Prussia in the 17th-19th centuries. It was built by Emil Kluge, a German immigrant who found his way to Helena in the 1870's. In Helena he tried various occupations, including mining and road contracting, and served in various city positions.

21. LEMHI PASS
This mountain pass, formerly bordering the Louisiana Territory, was used by the Lewis and Clark Expedition in 1805. Upon crossing the Continental Divide here, the expedition left United States lands and entered Spanish territory. The Shoshoni Indians found in the area gave valuable assistance to the expedition. (approximately 25 miles west of Grant on the Montana-Idaho border)

22. LOLO TRAIL
The Lolo Trail is a 150-mile-long Nez Perce Indian buffalo trail that was followed by the Lewis and Clark Expedition in 1805 as it attempted to cross the Bitterroot Moun-

Pictograph Cave. (F&G photo by Harley Yeager)



tains on its way to the Pacific. Today the highway paralleling the old trail stretches through wild country much the same as it was in the 1800's. (parallel to U.S. 12 west out of Lolo)

23. MADISON BUFFALO JUMP

This site represents a hunting technique used by prehistoric man in Montana some 2,000 years ago. The technique consisted of leading or stampeding buffalo over a cliff. The jump complex includes an old Indian village site located at the bottom of the jump where the buffalo meat was collected. (17 miles south of Logan off Interstate 90)

24. PICTOGRAPH CAVE

The cave is a key aboriginal occupation site of the middle to late prehistoric period. It has helped archaeologists determine the sequence of prehistoric occupation in the northwestern plains. The walls once displayed many original Indian pictographs but because of excavation, weathering and vandalism, few remain. (7 miles southeast of Billings via U.S. 87 and secondary road)

25. POMPEY'S PILLAR

Pompey's pillar is a massive block of sandstone about 150 feet high, encountered by the Lewis and Clark Expedition in 1806. Captain William Clark named the rock after Sacajawea's baby son and carved his signature, which still remains today. (west of Pompey's Pillar on U.S. 10)

26. RUSSELL (CHARLES M.) HOUSE AND STUDIO, GREAT FALLS

This is the former home and studio of Montana's famous western artist and sculptor, preserved as it was in the early 1900's. Russell occupied the house from 1900 until his death in 1926. The log studio was built in 1903. He gained recognition for the realistic detail of his paintings of frontier life.

27. ST. MARY'S MISSION CHURCH AND PHARMACY

St. Mary's was the first Catholic mission in the Northwest. It was established by Father DeSmet in 1841, then closed and reestablished in Stevensville in 1866. The original church and pharmacy building are still standing near a new Catholic church. (Stevensville)

28. THREE FORKS OF THE MISSOURI

In 1805 the Lewis and Clark Expedition rested here and chose the next direction of its journey, up the Jefferson River to the southwest. Here the Jefferson, Madison and Gallatin Rivers merge to form the Missouri. (3 miles east of Three Forks and 3 miles north of U.S. 90)

29. TRAVELER'S REST

The Lewis and Clark Expedition planned its exploration routes at this camp in 1805 and prepared for its westward crossing of the Bitterroot Mountains. On its return from the coast in 1806, the expedition stopped here again to plan routes which Lewis and Clark would take separately .Lewis proceeded to explore the Marias River area and Clark headed for the upper Yellowstone River area. (1 mile south of Lolo near U.S. 93)

30. TWO MEDICINE FIGHT SITE

Lewis' party encountered a hostile band of Blackfeet Indians here in 1806. One Indian was killed and the rest were driven off. Lewis was nearly shot. The party hastened to reach the Missouri River to avoid confrontation with a larger band of Blackfeet in the vicinity. (approximately 15 miles southwest of Cutbank on the Blackfeet Reservation)

31. VIRGINIA CITY HISTORIC DISTRICT

Virginia City was the site of the state's second major gold discovery at Alder Gulch in 1863, one of the greatest in the West. It became Montana's second territorial capital in 1865 and attained its greatest importance from 1865-1875. The Vigilantes were strong in Virginia City and did away with the infamous Henry Plummer gang. Much of the town has been restored to reflect the earlier era.

Canyon Ferry Recreation Area offers hours of the finest outdoor recreation for people of all ages. (F&G photo by Joyce MacDuffie)

OUR OUTDOOR HERITAGE

A section in the Montana statutes states, "Montana is uniquely endowed with scenic landscapes and areas rich in recreational value. This outdoor heritage enriches the lives of citizens, attracts new residents and businesses to the state and is of major significance to the expanding tourist industry. It is the purpose of this act to give authority to the Montana Fish and Game Commission to plan and develop outdoor recreational resources in the state which (authority) shall permit receiving and expending funds including federal grants for this purpose."

With the acceptance of the challenge and responsibility embodied in this act the commission and the department embarked on a major undertaking involving not only the state agency but the local communities of Montana. The key words are, " . . . to plan and develop outdoor recreation resources in the state . . ." This is a big order. Montana's initial outdoor recreation plan was submitted and approved in the fall of 1965. Since then the plan has been updated twice to ensure eligibility under the Land and Water Conservation Program until August, 1972.

Under overall guidance provided by the plan and through the authority granted by this act almost 150 individual acquisition and development projects have been started or accomplished involving an overall expenditure of about $6.5 million. Each project, whether it is a major public recreation area, a swimming pool in a small community or the development of a city park and playground, has added to the total recreational resource of Montana.

Funds appropriated for use by the commission are not used in outdoor recreation projects completed by local communities. These projects are paid for by the communities and matched 50-50 with federal funds. On lands administered by the commission, state monies are used with matching federal funds.

The needs for outdoor recreation opportunities as delineated in the plan have not yet been met; however, progress has been made. We stand ready, willing and able to complete the goals outlined in the plan, if adequate support and funding are forthcoming.

Frank H. Dunkle

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